M16C/62P Compact Emulator

S3062PT-CPE-2

Compact Emulator
with Real-time Trace

User's Manual

Sunny Giken Inc.

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For inquiries about the contents of the product or this manual, fill in the "Technical Support Application Form" included in the manual and fax it to our dealer, Renesas Technology Corporation's technical support desk. When sending an email, write the same items of the "Technical Support Application Form" and send it to Renesas Technology Corporation's support desk (support_apl@renesas.com).

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Preface

Thank you for purchasing the S3062PT-CPE-2. S3062PT-CPE-2 is a compact emulator with the real- time trace function for M16C/62 group and M16C30P group.

This User's Manual mainly describes specifications of the S3062PT-CPE-2, how to set up and operate it. For details of the following products, which are used with the S3062PT-CPE-2, please refer to online manuals attached to each product.

- Emulator debugger: PD30S
- C compiler: NC30WA Entry Version.
- Integrated development environment: TM

If you have any question or doubt about this product, please contact Sunny Giken Inc..

To use the product properly

Precautions for Safety

- In both this User's Manual and on the product itself, several icons are used to ensure proper handling of this product and also to prevent injuries to you or other persons, or damages to your properties.
- The icons' graphic images and their meanings are given in "Chapter 1. Precautions for Safety". Be sure to read this chapter and understand it before using the product.

IMPORTANT

Checking the Emulator:

- For checking whether the S3062PT-CPE or S3062PT-CPE-2 is supported, see the Rev. number on the back of the emulator.

  Rev.1 – Rev.A :S3062PT-CPE (Internal ROM384K version)
  Rev.B or later :S3062PT-CPE-2 (Internal ROM512K version)

Terminology

Some specific words used in this User's Manual are defined as follows:

- **Emulator**

  This means the S3062PT-CPE-2 (this product).

- **Emulator system**

  This means the emulator system built around the S3062PT-CPE-2 emulator. The minimum S3062PT-CPE-2 emulator system is configured with an emulator, host machine and emulator debugger.

- **Host machine**

  This means a personal computer used to control the emulator.

- **Emulator debugger**

  This means a software tool, PD30S to control the emulator from the host machine through an communications interface.

- **Emulate MCU**

  This means the internal microcomputer mounted on the emulator which is operated in the specific mode exclusively for tools.

- **Target MCU**

  This means the microcomputer you are going to debug.

- **Target system**

  This means an operation application system using the microcomputer to be debugged.

- **'*' after a signal name**

  The symbol "* " that is put after a signal name is used to show active LOW signal.

  (e.g. RESET* :Reset signal.)

- **Vcc1, Vcc2 pins**

  For both Vcc1, and Vcc2 pins, Vcc indicates the power supply voltage of the target MCU.

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MEMO

Chapter 1. Precautions for Safety

This chapter describes precautions for using this product safely and properly. For precautions for the emulator debugger, please refer to User's Manual included with your product.

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Chapter 1. Precautions for Safety

In both the User's Manual and on the product itself, several icons are used to ensure proper handling of this product and also to prevent injuries to you or other persons, or damages to your properties.

This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read and understand this chapter before using this product.

1.1 Safety Symbols and Meanings

⚠WARNING	If the requirements shown in the "WARNING" sentences are ignored, the equipment may cause serious personal injury or death.
⚠CAUTION	If the requirements shown in the "CAUTION" sentences are ignored, the equipment may cause personal injury or damages to the products.
IMPORTANT	This shows other important notes for using this product.

In addition to the three above, the following symbols are also used:

means WARNING or CAUTION

Example: **CAUTION AGAINST AN ELECTRIC**

means PROHIBITION

Example: **DISASSEMBLY PROHIBITED**

means A FORCIBLE

Example: **UNPLUG THE POWER CABLE FROM THE RECEPTACLE.**

The following pages describe the symbols "WARNING", "CAUTION", and "IMPORTANT".

⚠ WARNING

Warning for Installation:

•Do not set this product in water or areas of high humidity. Spilling water or some other liquid into the main unit can cause an unrepairable damage.

Warning for Operating Environment:

•This equipment is to be used in an environment with a maximum ambient temperature of 35 degrees C. Care should be taken that this temperature is not exceeded.

⚠ CAUTION

Modifying This Product:

•Do not disassemble or modify this product. Disassembling and modifying the product will void your warranty.

Cautions to Be Taken for Handling This Product:

•Use caution when handling the main unit. Be careful not to apply a mechanical shock.

•Do not touch the connector pins of the emulator main unit and the target MCU connector pins directly. Static electricity may damage the internal circuits.

•Do not pull the compact emulator main unit with the PC cable for connecting to the target system. The cable may be caused a break.

•Do not apply a voltage other than the specified voltage of the product, because it may cause burns by abnormal heat generation and the failure of internal circuits.

IMPORTANT

Note on Malfunctions in the System

•If the emulator malfunctions due to the interference like external noise, please shut OFF power to the emulator once and then reactivate it.

IMPORTANT

Notes on Differences between the Actual MCU and Emulator:

•Operations of the emulator differs from those of flash memory version MCUs as listed below.

(1) Reset condition

Set the time for starting up (0.2 to 0.8Vcc) 1[μs] or less.

(2) Data values of RAM and ROM areas at power-on

When power is turned on, the RAM and ROM areas of the emulator are defaulted to FFh.

(3) Register values when power is turned on

When power is turned on, the emulator's register values are defaulted to 0. However, the program counter and ISP are defaulted to FFFFFh and 500h respectively.

(4) MCU Functions

On the emulator system, some of the MCU functions cannot be used. Please refer to the page 10 "Notes on MCU Functions That Cannot Be Used with This Emulator" for details.

(5) Port Emulation

P0-P5, P10 are implemented by emulate circuit; their electrical characteristics are different.

P1, P3, P4, P5	The pull-up control register can be set, but actual signals will have 510KΩ resistance automatically at input/output.
P0, P2	The pull-up control register can be set, but actual signals will have 510KΩ resistance automatically at input/output. However, only when the analog input is set, the pull-up circuit is disabled.
P10	Regardless of input/output, pull-up control register sets the 510KΩ resistance automatically . However, only when the analog input is set, the pull-up circuit is disabled. Note that once you set the analog input, pull-up circuit will remain disabled unless analog port is switched to another port or RESET button of the program is pressed on GUI.

* When using A/D converter, input is sent through the analog switch to A/D port.

* For ports other than P10, output voltage may be lower than actual chip depending on the connecting circuits.

(6) Bus Timing Delay in Memory Expansion Mode

In the Memory Expansion Mode, occurrences of signals such as address, data, RD, and WR may delay against the BCLK for the maximum of half of the BCLK time.

(7) BCLK

The BCLK output-forbidden bit is disabled during the memory expansion mode. Note that output is done regularly.

(8) PLL Circuit

This product has a built-in external PLL circuit of the PLL synthesizer, and when using PLL, the internal circuit will be operating.

•As items such as a package conversion unit are used between the emulate MCU and the target system, some characteristics are slightly different from those of the actual MCU. Therefore, be sure to evaluate your system with an evaluation MCU. Before starting mass mask production, evaluate your system and make final confirmation with an ES (Engineering Sample) version MCU.

IMPORTANT

Notes on MCU Functions That Cannot Be Used with This Emulator:

•The following MCU features cannot be used with this emulator.

(1) Debugging cannot be done with this emulator in the "micro-processor mode".

•When using this emulator, always set the processor mode bit in the processor mode register to the "single-chip mode" or "memory expansion mode".

•When using this emulator, fix the CNVSS pin at "L" level.

•Only a separate bus can be used in the "memory expansion mode". A multiplex bus cannot be used.

(2) Oscillation circuits that use an oscillator cannot be used.

Because a package converter board is situated between the emulate MCU and the target system, oscillation circuits in which an oscillator is connected between the X_{IN} and X_{OUT} pins will not oscillate.

(3) Watchdog timers cannot be used.

MCU watchdog timers can only be used during program execution (free running). Disable watchdog timers in all other program operations (break, dump, program forced stop, etc.).

Also, if the target system has a watchdog timer in its reset circuit, disable it, too, when using the emulator.

(4) Single step interrupts cannot be used.

Single step interrupts cannot be used. The vector address of the single step interrupts is always indicated in the emulator work area, and the vector address value cannot be changed.

(5) Software resets cannot be used.

Do not use software resets.

(6) Flash memory and EPROM modes are not emulated.

This emulator does not emulate the flash memory and EPROM modes. Also, the emulator does not emulate the CPU rewrite mode in the flash memory mode.

IMPORTANT

Notes on Restrictions in Using the Emulator:

•The following restrictions apply to this emulator:

(1) Debug command execution when the BCLK is stopped:
When the BCLK is stopped, debug commands (break, dump, single-step, program forced stop, etc.) cannot be executed. The BCLK can stop in the following cases:

•When the target clock is not oscillating;
•When the target MCU is on hold;
•When the target MCU is in the stop mode.

(2) MCU status during program hold:
With this emulator, putting the MCU on hold can stop the loop program at the specified address. Note that, in this case, peripheral circuits are still operating.

(3) Interrupts during single step execution:
Interrupts are disabled during single step execution. Accordingly, interrupt processing is not performed even if an interrupt request is sent.

(4) Address matched interrupt:
Do not set software breaks for an address for which an address matched interrupt is set. In step execution, do not execute addresses that generate address matched interrupts.

(5) Stop and wait modes:
Do not use a single step for the command that shifts to the stop mode. Operation does not shift to the wait mode when the command that shifts to the wait mode is executed as a single step.

(6) Stack area:
This emulator consumes 16 bytes of user stacks specified by ISP. If there is not enough user stack area, it uses other areas not usable as stacks (SFR area, RAM area that stored data or ROM area), which may damage the user program or destabilize emulator control. Therefore, ensure the maximum +16 bytes of the area used by the user program for user stack area.

(7) Trace results for addresses that set software breaks:
Software breaks replace the original command with the BRK command that generates the BRK interrupt. When trace results are viewed in the bus display, "00_{16}" is displayed by fetching (by command) the address that sets the software break, however in the reverse assembly display, the "BRK" command is displayed.

(8) Protect register (PRC2):
When the protect register (PRC2) that enables writing in the port P9 direction register and the menu key registers A3 is changed in the following way, the protect is not cancelled.

1) When the "command that sets PRC2 to '1' is executed (step execution)"
2) When the program is executed with a break point set between the "commands that set PRC2 to '1'" and "when the register to be protected is set"
3) When "PRC2 is set to '1'" in the Dump or Script windows

(9) Debug command execution during user program execution:
The real-time aspect of the user program is not guaranteed when debug commands such as dump are executed during user program execution.

IMPORTANT

(10) Debugging during X_{CIN} execution

In the emulator system, internal memory (ROM; Flash memory, RAM) is used for the emulation memory. Note that debugging may not be able to continue if debug command is executed in a slow clock cycle in X_{CIN}, such as 32.768kHz, due to the PD30S timeout.

(11) Response during user program execution

User programs and data to the emulation memory are updated just before user program execution. Therefore, it may take several seconds before the user program execution if it needs to load a large program or to rewrite software breakpoints.

(12) Hardware break

Break will occur after the execution, however, as operations such as the emulator's conditional judgment and MCU prefetch will accompany, it will be halted after processing a few instructions.

(13) Data Rom area from F000H to FFFFH

This ROM area can be rewritten only by downloading target programs. Rewriting by DUMP window, and debugging by placement of execution codes are not possible.

(14) Debugging during DMA Operation

The debugger does not stop repeat transfer of the DMA during the operation of DMA repeat transfer, even when the debugger is abeyant. However, it may cause an abnormal operation of the target program when you re-execute the program.

Follow either one of the following instructions when you are to debug the target program which operates the DMA repeat transfer:

- Before re-executing the target program, change the register directly to stop the DMA. Then execute it.
- Set it to break with the DMA repeat transfer in abeyance.

IMPORTANT

Notes on Controlling MCU Pins:

•Some MCU pins controlled by the emulator.

(1) RESET* input
The RESET* input from the target system is accepted only the time during a user program is being executed (only when the RUN Status LED of the emulator is lit.)

(2) NMI* input
The NMI* input from the target system is accepted only the time during a user program is being executed (only when the RUN Status LED of the emulator is lit).

Notes on the Target System (power supply requirements, order of powering on):

•On this emulator, Vcc pins are connected in order to monitor the power voltage, and it cannot supply the power to the target system. Therefore design your system so that the target system is powered separately.

•The voltage of the target system should be within the range of MCU specifications.

•Before powering on your emulator system, check that the host machine, the emulator, the converter board and the target system are all connected correctly. Then, turn on the power to each equipment following the procedure below.

(1)Turn ON/OFF the target system and the emulator as simultaneously as possible.

(2)When the emulator debugger starts up, check the target Status LEDs on the emulator to see if this product is ready to operate.

Is the power supplied? : Check that target Status LED (Power) is ON. *1
Is the clock supplied? : Check that target Status LED (Clock) is ON. *2

*1 It is lit when the emulator is turned on.

*2 It is lit when the main clock is supplied to the emulator: it is not lit when the sub-clock is supplied from the target (X_{CIN}).

Chapter 2. Usage

This chapter describes how to operate this product.

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Chapter 2. Usage

2.1 Name of Each Part

(1) System Configuration

Figure 2.1 shows the system configuration for this emulator.

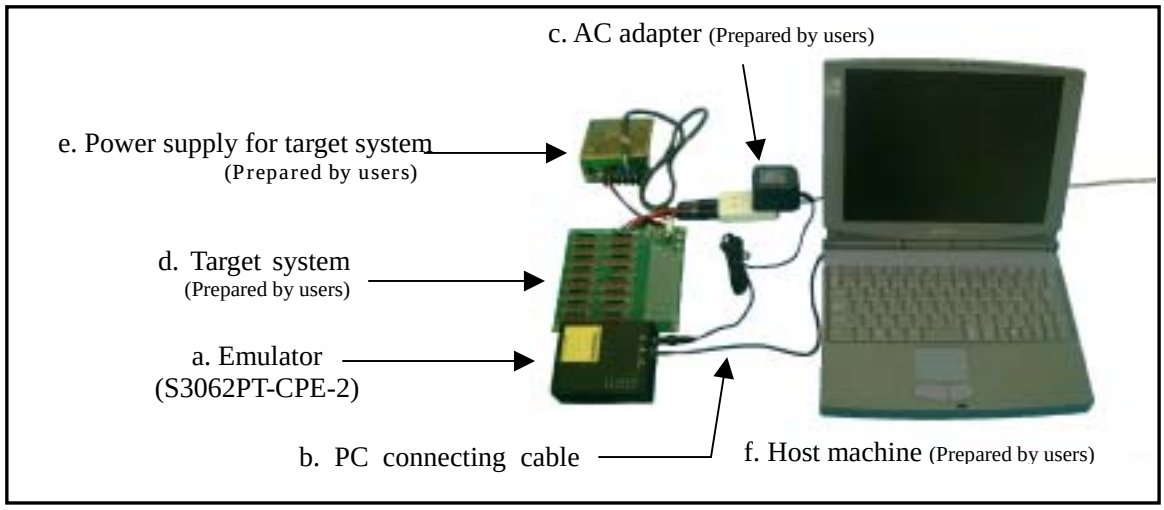


Figure 2.1 System configuration

(a) Emulator S3062PT-CPE-2 (included)

This is a compact emulator with the real-time trace function for the M16C/62P group and M16C/30P group. (Herein after referred as "emulator".)

(b) PC connecting cable (included)

This is a USB interface cable for the host machine and the emulator.

(c) Power supply for emulator (Prepared by users)

This is a power supply for the emulator. Prepare the power supply separately. The DC cable is included with this product.

(d) Target system (Prepared by users)

This is your application system. This emulator can be used without a target system.

(e) Power supply for the target system (Prepared by users)

This is a power supply for the target system. As this emulator cannot supply the power to the target system, supply the power to the target system separately from the emulator.

(f) Host machine (Prepared by users)

This is a personal computer for controlling the emulator.

Prepare operation environment in which Windows98/Me/2000/XP OS can operate.

(2) Name of Each Part of Emulator

Figure 2.2 shows the name of each part of the emulator.

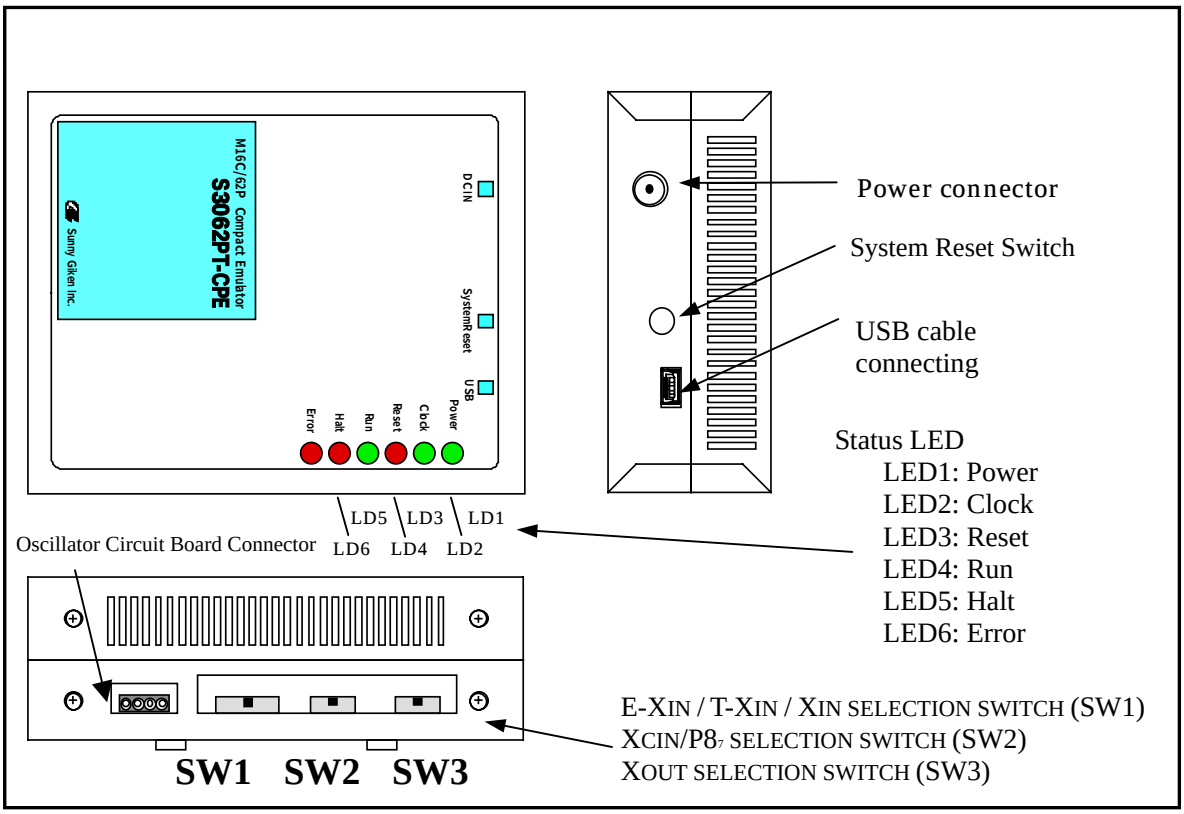


Figure 2.2 Name of each part of emulator (upper side of S3062PT-CPE-2)

(a) Status LED

The Status LEDs indicate the target MCU's power supply and operating status.

Table 2.1 Definition of Status LED

Name	Number	Color	Status	Function
Power	LD1	Green	ON	Power is supplied to the target MCU.
			OFF	Power is not supplied to the target MCU.
Clock	LD2	Green	ON	Main clock is supplied to the target MCU.
			OFF	Main clock is not supplied to the target MCU.
Reset	LD3	Red	ON	Target MCU is resetting.
			OFF	Target MCU setting is canceled.
Run	LD4	Green	ON	User program is being executed.
			OFF	User program has been halted.
Halt	LD5	Red	ON	Target MCU halts operation due to either command or conditions of hardware.
			OFF	Target MCU is operating.
Error	LD6	Red	ON	Emulator system has error.
			OFF	Emulator system has no error.

(b) System reset switch

By pressing the system-reset switch, you can initialize the emulator system. Table 2.2 shows the functions of the system reset switch depending on the state of emulator.

Table 2.2 Functions of system reset switch

Status of Emulator	Function
When the system reset switch is pressed within 2 seconds of turning on the power.	Changes into a special mode. (All indicators other than Power ON and Clock of the Status LED flash.) Then, when the emulator debugger, PD30S is started, changes into a mode to force downloading a firmware.
When the system reset switch is pressed during the special mode.	Executes self-check. (All indicators other than Power ON and Clock of the Status LED shift-flash.)
When the system reset switch is pressed while the user program is being halted.	Initializes the emulator and waits for commands from the emulator debugger.
When the system reset switch is pressed while the user program is being executed.	Halts the user's program, initializes the emulator, and waits for commands from the emulator debugger.

⚠ CAUTION

Notes on System Reset Switch:

- After pressing the system reset switch, reboot the emulator debugger PD30S; otherwise the display of emulator debugger and the actual value (in the emulator) may not match.
- When the emulator debugger does not start up normally even after rebooting, turn off the emulator and then turn on again.

2.2 Starting Up the Emulator

The procedure for starting up the emulator is shown in Figure 2.3. For more details, refer to each section hereafter. And, when the emulator does not start up properly, refer to "Chapter 5. Troubleshooting" (page 38).

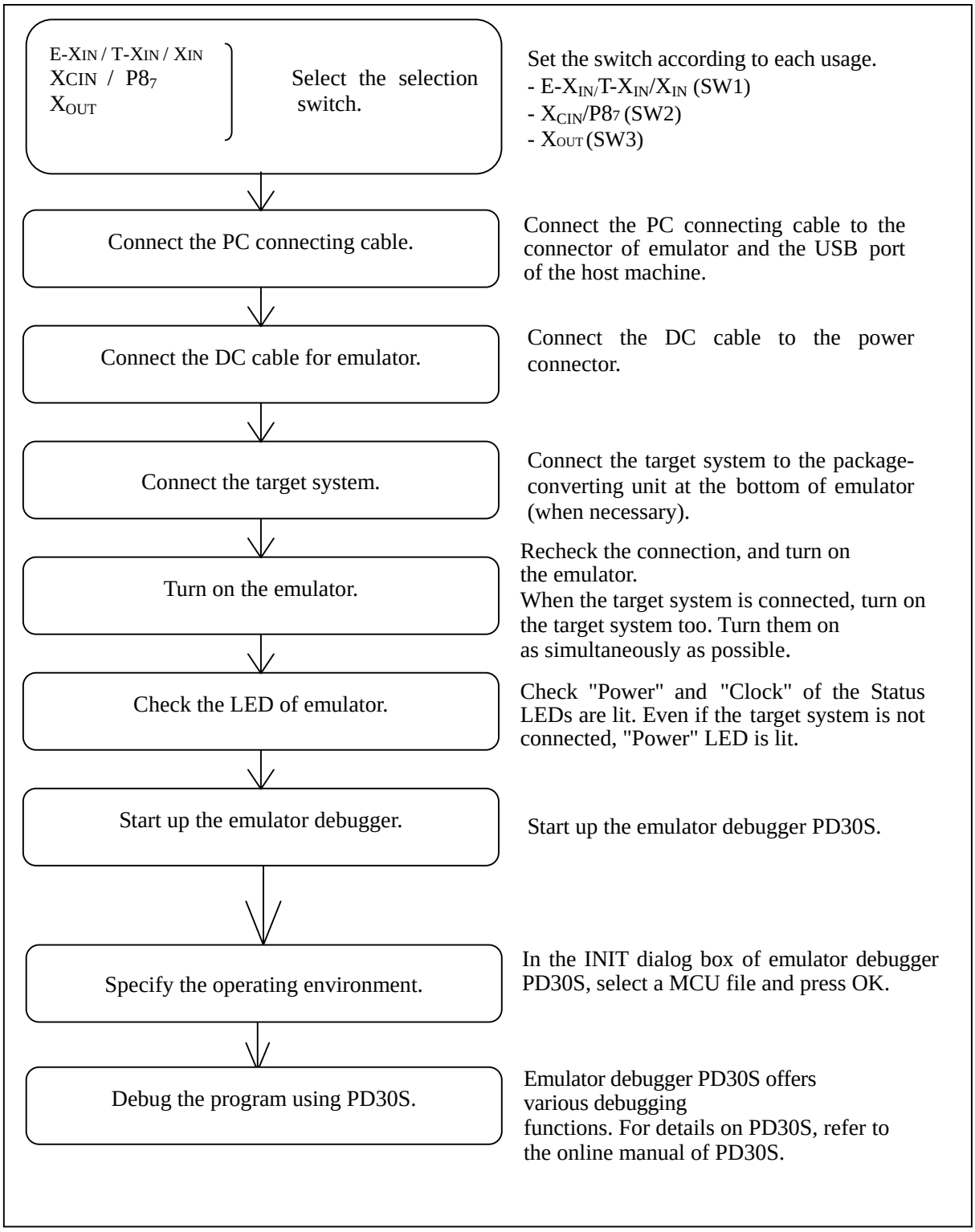

E-XIN / T-XIN / XIN
XCIN / P87
XOUT
Select the selection switch.
Set the switch according to each usage.
- E-XIN/T-XIN/XIN (SW1)
- XCIN/P87 (SW2)
- XOUT (SW3)
Connect the PC connecting cable.
Connect the PC connecting cable to the connector of emulator and the USB port of the host machine.
Connect the DC cable for emulator.
Connect the DC cable to the power connector.
Connect the target system.
Connect the target system to the package-converting unit at the bottom of emulator (when necessary).
Turn on the emulator.
Recheck the connection, and turn on the emulator.
When the target system is connected, turn on the target system too. Turn them on as simultaneously as possible.
Check the LED of emulator.
Check "Power" and "Clock" of the Status LEDs are lit. Even if the target system is not connected, "Power" LED is lit.
Start up the emulator debugger.
Start up the emulator debugger PD30S.
Specify the operating environment.
In the INIT dialog box of emulator debugger PD30S, select a MCU file and press OK.
Debug the program using PD30S.
Emulator debugger PD30S offers various debugging functions. For details on PD30S, refer to the online manual of PD30S.

Figure 2.3 Procedure for starting up the emulator

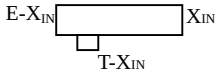
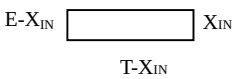
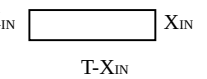
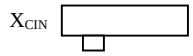
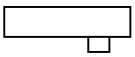
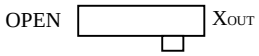
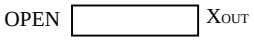
2.3 Emulator Initial Setup

Set the selection switches of the emulator according to purposes of use.

(1) Selection Switches

They are the switches to select the function of E-X_{IN}/T-X_{IN}/X_{IN}, X_{CIN}/$P8_7$, and X_{OUT} pins. As shown in Table 2.3 below, set the switch according to the usage of the pins.

Table 2.3 Setting the selection switch

Signal Name	SW No.	Selection Switch Setting		
E-X_{IN}/ T-X_{IN}/ X_{IN}	SW1	 Clock input from oscillator circuit board (option)	 Clock input from the target circuit board. (oscillation device only)	 Internal clock input (6MHz standard, factory setting)
X_{CIN}/$P8_7$	SW2	 Using internal emulator sub-clock (32.768kHz)	 Using $P8_7$ pin or target X_{CIN} (factory-setting)	
X_{OUT}	SW3	 Connecting X_{OUT} pin to the target system	 Leaving X_{OUT} pin OPEN (factory-setting)	

⚠ CAUTION

Notes on Setting Switches and Jumper Switches:

- Always shut OFF the power when changing the settings of the switches and jumper switches, and connecting the cable.
- $T\text{-}_{XIN}$, X_{CIN} are used only when the target clock is output from oscillation device. They cannot be used for oscillators such as quartz or ceramics.

2.4 Connecting the Emulator System

How to connect the emulator system is shown in Figure 2.4 below.

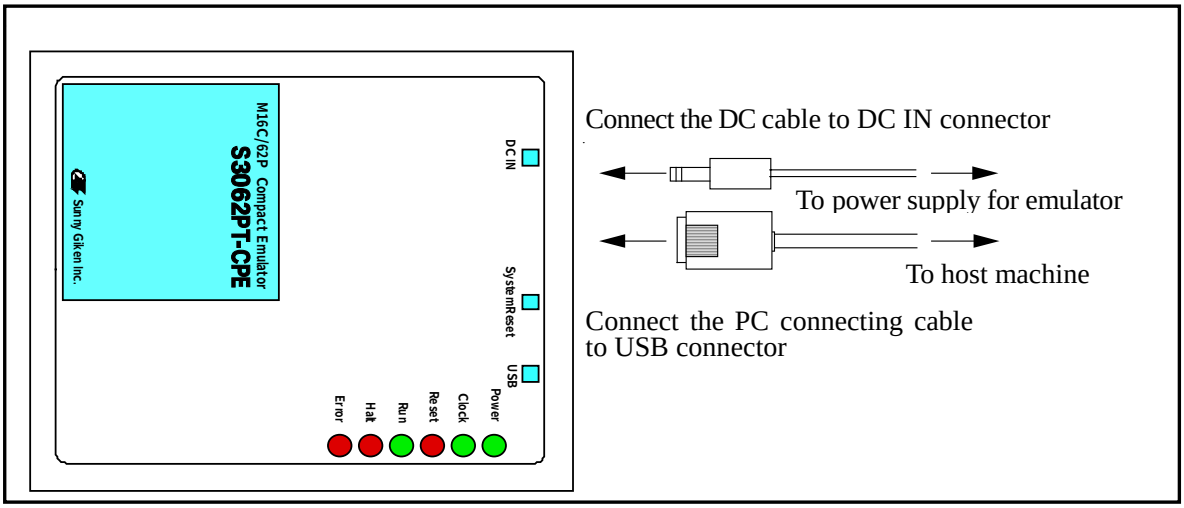


Figure 2.4 Connecting the emulator system

(1) Connecting the PC Connecting Cable

Connect the PC connecting cable (included) to the USB connector and the USB port of the host machine (see Figure 2.4).

(2) Connecting the DC Cable

Connect the DC cable for the emulator to the DC IN connector. The specifications of the power supply for the emulator are listed in Table 2.4.

Table 2.4 Specification of power supply of emulator

Power supply voltage	DC9V/1.1 A

Figures 2.5 shows the specifications of the applicable plug, respectively.

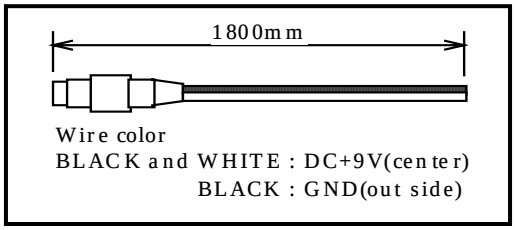


Figure 2.5 Specification of DC cable

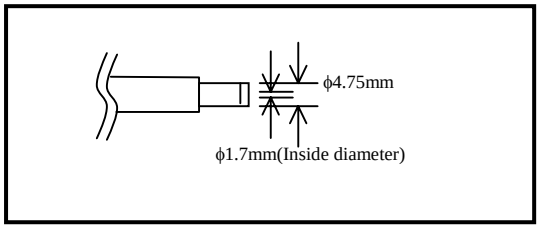


Figure 2.6 Specification of applicable plug

CAUTION

Note on Connecting the Power Supply of Emulator:

- Be cautious about the polarity of the power supply. Connecting to the wrong electrode could destroy internal circuits.
- Do not apply a voltage other than the specified voltage of the product (9V 1.1A), since it may cause burn injuries and the failure of internal circuits.
- Be cautious when connecting the target system, as there is no power switch on the emulator, and the emulator is turned on when DC9V is supplied from power unit.

2.5 Connecting the Target System (as occasion demands)

(1)Standard Connection

Connect the package S30830T-PTC1 conversion unit on the lower board of the emulator to a LCC socket (option) on the target system. Make sure the position of No.1 pin before connecting. The emulator can be used without a target system.

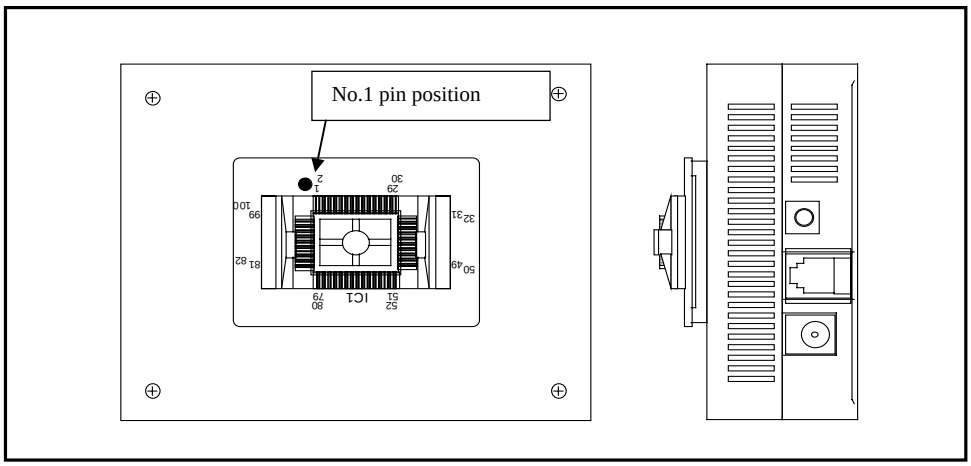


Figure 2.7 Package conversion unit on the lower board of the emulator

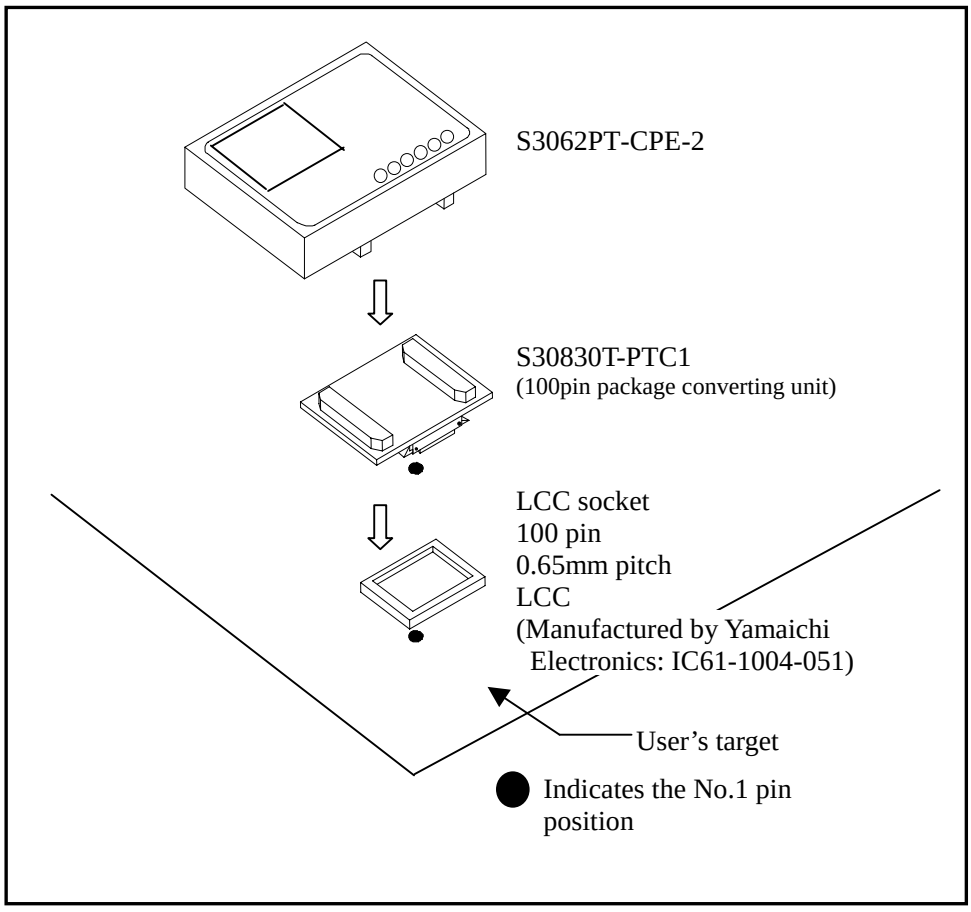


Figure 2.8 Connecting 100-pin LCC socket

⚠ CAUTION

Notes on Connecting Target Systems:

- Be cautious not to attach the converter board in a wrong direction. It will cause a fatal damage to the compact emulator.
- Always shut OFF power of the emulator and the target system when connecting and disconnecting the target system.

2.6 Turning On the Power

(1) Checking the Connection of the Emulator System

Before turning the power ON, check the connection of the host machine and the emulator main unit.

(2) Turning On the Power

Power ON the target system and the emulator main unit. Power ON/OFF the target system and the emulator main unit should be done as simultaneously as possible.

⚠ CAUTION

Notes on Power Supply:

- As this emulator cannot supply power to the target system, provide the target system with a separate power supply from that of the emulator.
- Do not change target system power supply voltage after power has been activated.
- The emulator is turned on by supplying DC9V from the power source unit, after connecting power source unit and emulator with DC cable.

2.7 LED Display When the Emulator Starts Up Normally

After the emulator starts up, check the status of the LED to see if the emulator can be operated.

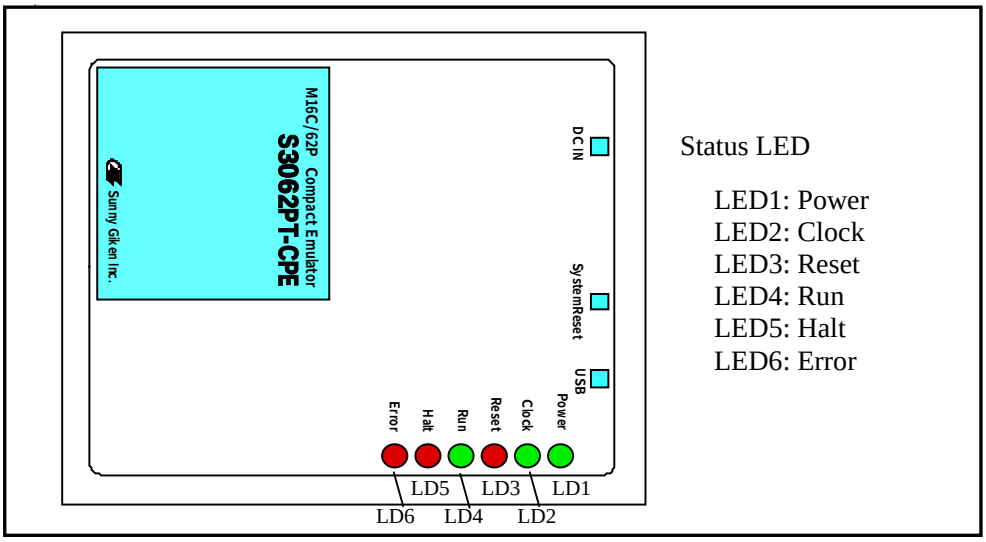


Figure 2.9 Positions of Status LED

Check to see if the POWER of the Status LED is lit immediately after the power is turned on. If it is not lit, shut off the power for the emulator and check if the power supply for the emulator is properly connected.

After the power is turned on, Status LEDs (LD1-6) will light for 12 seconds. Make sure that the display of the Status LEDs becomes normal after that.

If the Status LEDs do not light as shown in Table 2.5, see "5.1 Troubleshooting Until the Emulator Starts Up" (page 39).

Table 2.5 LED display when the emulator starts up normally

Error	Halt	Run	Reset	Clock	Power
○					

● :ON ○ :OFF

Note: This can be applied when operating with or without connection to a target system.

2.8 Starting Up Emulator Debugger PD30S

After checking the emulator has started up normally, start up the emulator debugger PD30S.

2.9 Setting the Operating Environment of Emulator Debugger PD30S

After starting up PD30S, as the Init dialog box will open, set as shown in Figure 2.11. For details of the Init dialog box, refer to User's Manual of PD30S.

(1) INIT Screen

After starting up PD30S, Init dialog box will open. Set as per figure 2.10. Please refer to the PD30S User's manual for details of Init dailog box.

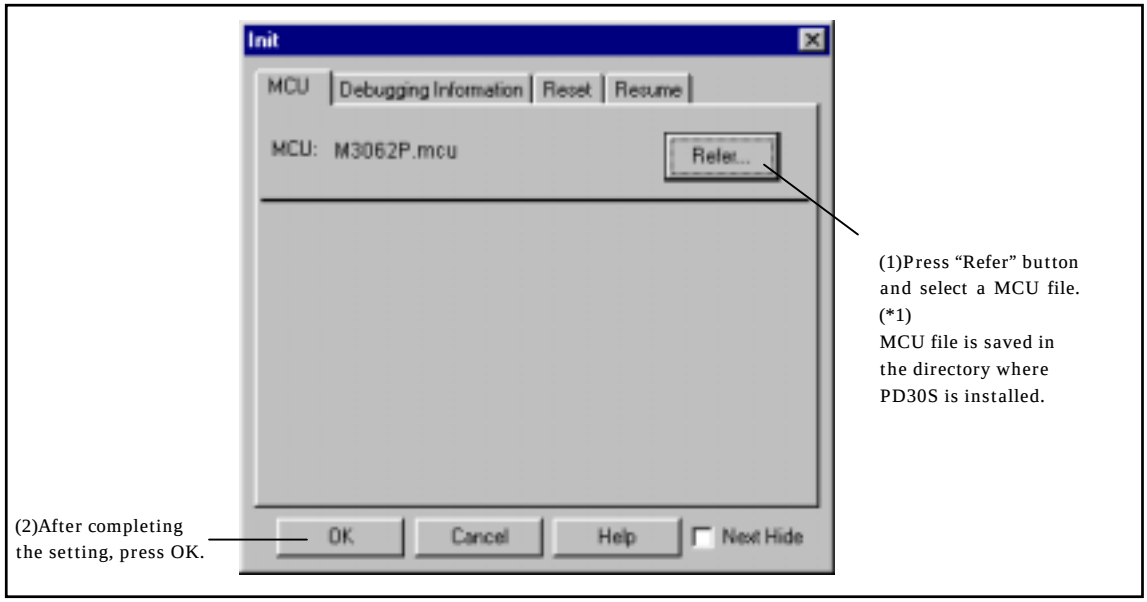


Figure 2.10 Init dialog setting

MCU file to be selected
- Select M3062PC_512K.MCU when using in single-chip mode.
- Select M3062PC_512K.MCU when using 80000H-CFFFFH as internal ROM in memory expansion mode.
- Select M3062PC_192K.MCU when using 80000H-CFFFFH as external memory in memory expansion mode.

(*Note) When using S3062PT-CPE:
- Select M3062PC_384K.MCU when using in single-chip mode.
- Select M3062PC_384K.MCU when using A0000H-CFFFFH as internal ROM in memory expansion mode.
- Select M3062PC_192K.MCU when using A0000H-CFFFFH as external memory in memory expansion mode.

IMPORTANT

Checking the Emulator:

- For checking whether the S3062PT-CPE or S3062PT-CPE-2 is supported, see the Rev. number on the back of the emulator.

  Rev.1 – Rev.A :S3062PT-CPE (Internal ROM384K version)
  Rev.B or later :S3062PT-CPE-2 (Internal ROM512K version)

(2) EMEM Screen

After pressing OK in the Init dialog box, select the mode to be used when following sceen appears:

- Select "Single Chip" for single chip mode.
- Select "Memory Expansion 16Bit" for memoery expansion mode (data bus 16 bit).
- Select "Memeory Expansion 8Bit" for memory expnsion mode (data bus 8 bit).

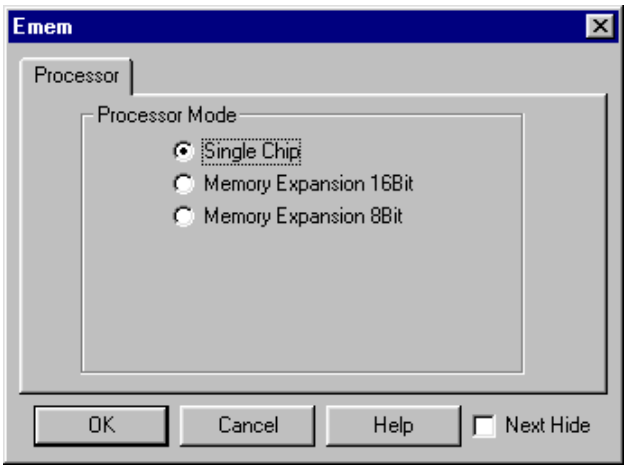


Figure 2.11 EMEM dialog setting

2.10 When Emulator Debugger PD30S Starts Up Normally

Figure 2.12 shows the screen when PD30S starts up normally.
If an error has been detected and PD30S has not started up, refer to "5.1 Troubleshooting Until the Emulator Starts Up" (page 39).

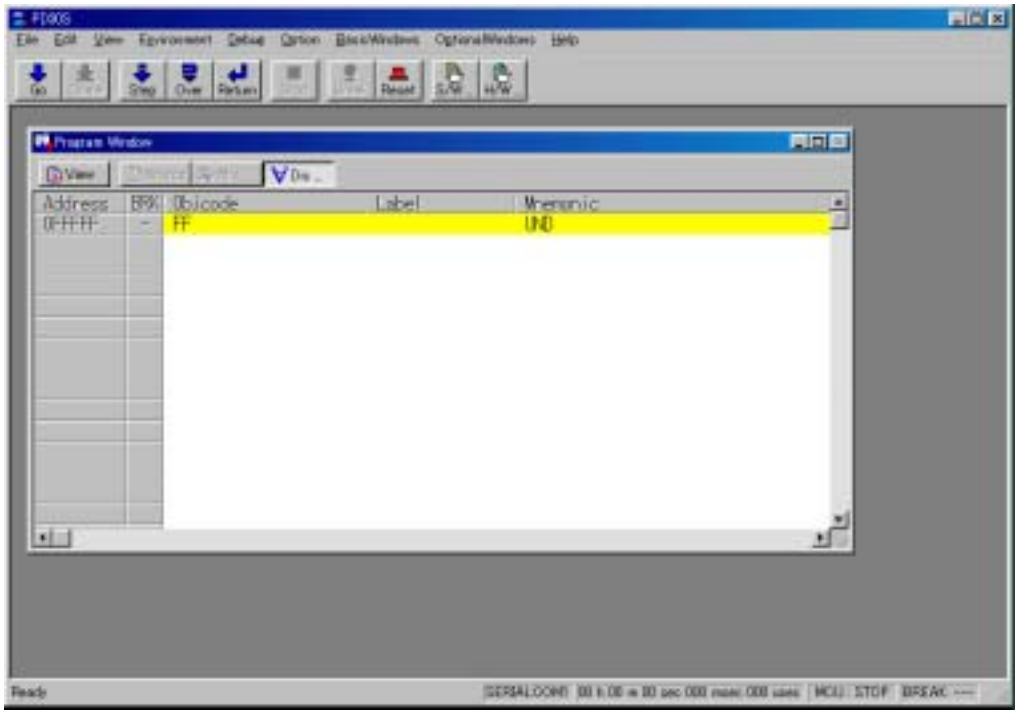


Figure 2.12 Screen of PD30S when it starts up normally

Chapter 3. Changing the Settings

This chapter describes how to change the settings of this product.

3.1 Changing Clock Supply 27

Chapter 3. Changing the Settings

3.1 Changing Clock Supply

There are three ways to supply a clock to the MCU, using the oscillator circuit of the emulator, the oscillator circuit on the target system (only for oscillator output), or the oscillator circuit board (option). Table 3.1 lists the factory-settings of each clock supply.

Table 3.1 Clock supply to the MCU

Clock	Description	Setting
X_{IN} – X_{OUT} (Main clock)	Internal oscillator circuit of emulator (6MHz)	SW1=X_{IN} Side
X_{CIN} – X_{COUT} (Sub clock)	Internal oscillator circuit of emulator (32.768kHz)	Selection switch SW2= $P8_7$ Side (Leave X_{COUT} open.)

(1) Changing MCU main-clock

Following is the procedure how to change the MCU main clock:

<1> Using oscillation circuit of the emulator
In the emulator, 6MHz internal clock is built-in. (Standard)
(Set SW1 on X_{IN} side.)

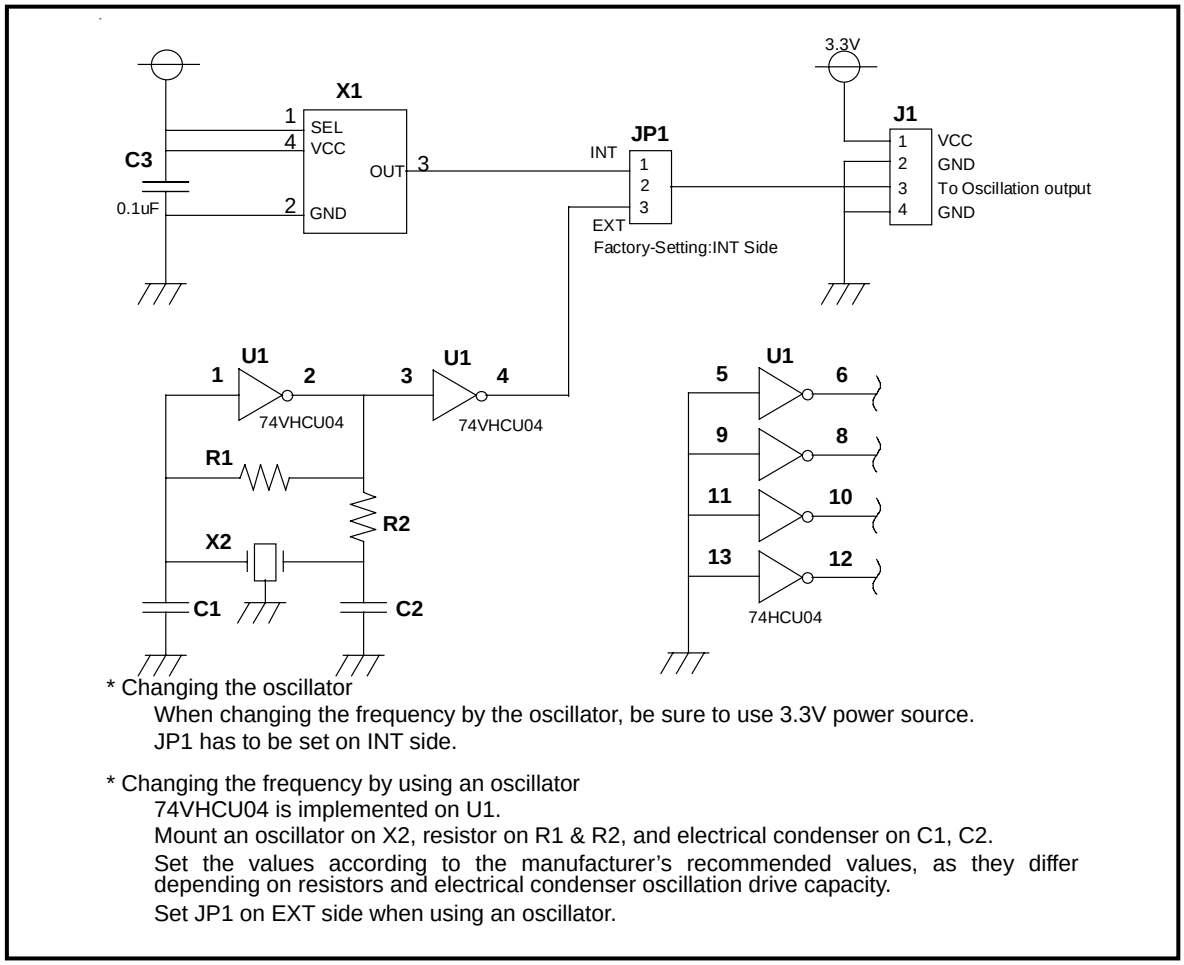
<2> Using oscillator circuit board (option)
If the emulator is going to be used in your desired oscillation frequency, please configure desired oscillation circuit using oscillation circuit printed board (option).

The figure 3.1 shows the oscillator circuit board contour and pin locations. The circuit of the oscillator circuit board (S30830T-OCS1) is shown in figure 3.2.
For mounting instructions, refer to page 29 "How to mount the oscillator circuit board (S30830T-OSC1)".

Example of a unit with oscillator

Figure 3.1 Outer shape of the oscillator circuit board (S30830T-OSC1)

The figure 3.2 shows the circuit of the oscillator circuit board (S30830T-OCS1).



* Changing the oscillator

When changing the frequency by the oscillator, be sure to use 3.3V power source.
JP1 has to be set on INT side.

* Changing the frequency by using an oscillator

74VHCU04 is implemented on U1.
Mount an oscillator on X2, resistor on R1 & R2, and electrical condenser on C1, C2.
Set the values according to the manufacturer's recommended values, as they differ depending on resistors and electrical condenser oscillation drive capacity.
Set JP1 on EXT side when using an oscillator.

Figure 3.2 The circuit of Oscillation circuit board (S30830T-OSC1)

IMPORTANT

Notes on Replacing Internal Oscillator Circuit of Emulator:

- Soldering is required to replace the emulator's internal oscillation circuit.
- Generally, the oscillator can be replaced only twice (removal and installation count as one time). Replacing it more than twice is not recommended since it will affect board pattern durability.
- Be cautious not to damage other devices when replacing the oscillator. Repairing damages incurred during oscillator replacement can be subject to billing even during the warranty period.

Figure 3.3 shows the mounting position of the oscillation circuit board.

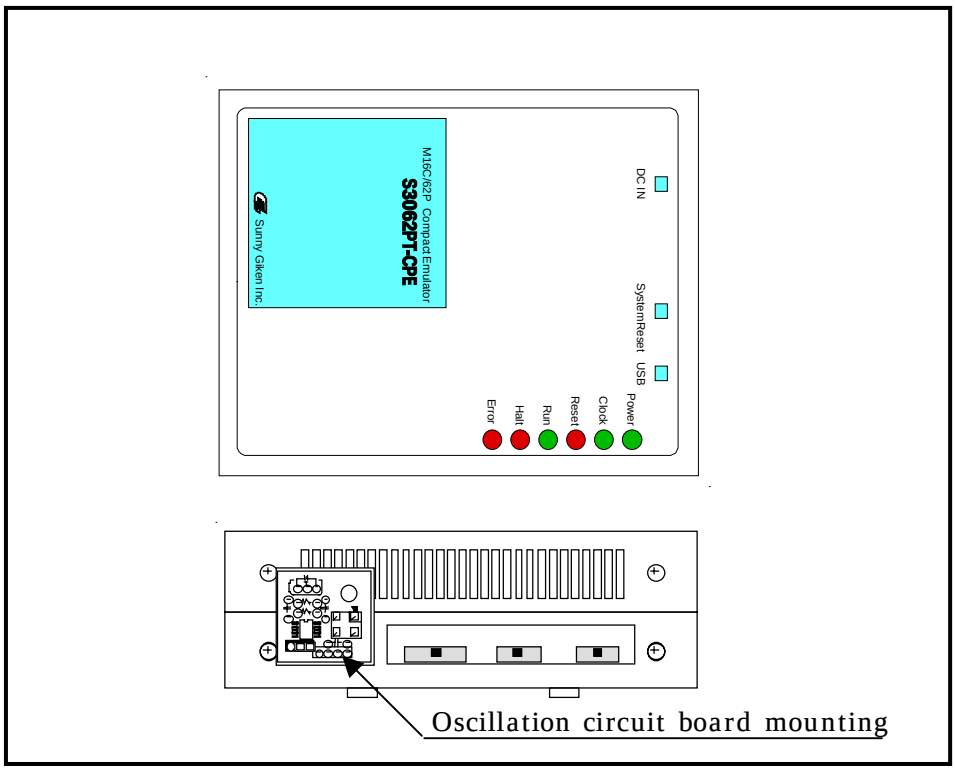


Figure 3.3 Oscillation circuit board (S30830T-OSC1) mounting position

Mount it to the oscillation circuit board connector.

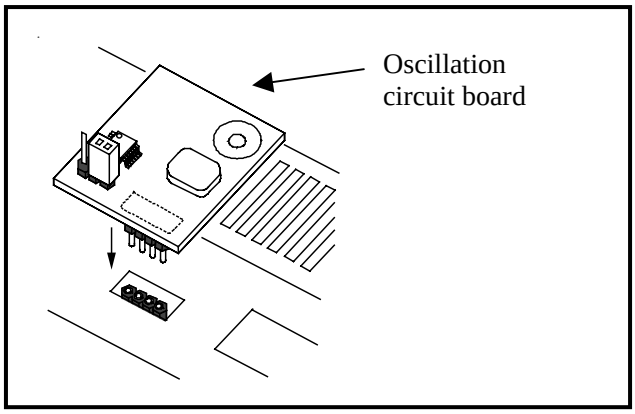


Figure 3.4 How to mount Oscillation circuit board (S30830T-OSC1)

⚠ CAUTION

Notes on Mounting Oscillation Circuit Board:

- Always shut OFF power of the emulator when mounting the oscillation circuit board.
- Be careful about the direction you mount the oscillation circuit board. Physically, the oscillation circuit board can be mounted in the reverse direction. In this case, power source and grounding will be connected in the wrong direction thus it may cause breakage.
- The emulator case is conductive. Make sure that pins on solder side of the oscillation board do not come in contact with the case.

<3> Using the oscillation circuit on the target system
When operating this product on the oscillation circuit of the target system, configure the oscillation circuit as indicated in figure 3.5, and input the oscillation output of 50% duty within the operating rage of the emulate MCU into X_{CIN}.

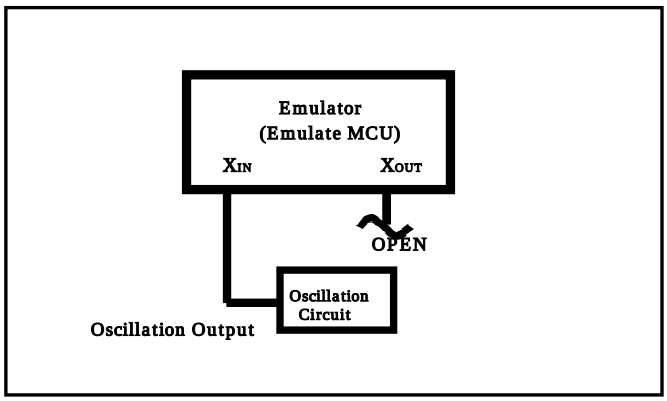


Figure 3.5 Target system Oscillation Circuit

As shown in the figure 3.6, in the oscillation circuit board where a resonator is connected between X_{IN} pin and X_{OUT} pin, there are parts such as an emulation circuit board between emulate MCU and the target system; it will not oscillate.

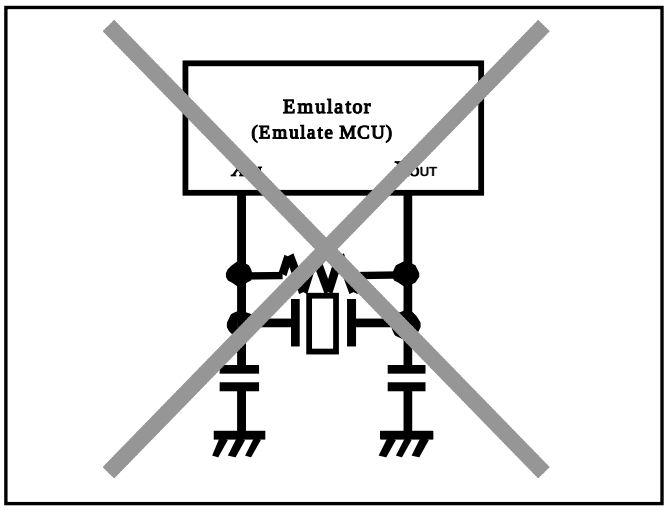


Figure 3.6 Circuit that does not oscillate in the emulator

(2) Changing MCU sub-clock

How to change the sub-clock supply is shown below.

(a)Using the oscillator circuit on the emulator
An oscillator for 32.768KHz is mounted inside the emulator.
(Set SW2 to X_{CIN}.)

(b)Using the oscillator circuit on the target system

When operating the emulator by the oscillator circuit on the target system, construct the circuit as shown in Figure 3.7 in the target system and input the oscillator output at 50% duty (within the operating range of the emulate MCU) into the XCIN pin. (Set SW2 to $P8_7$.) The XOUT pin should be open.

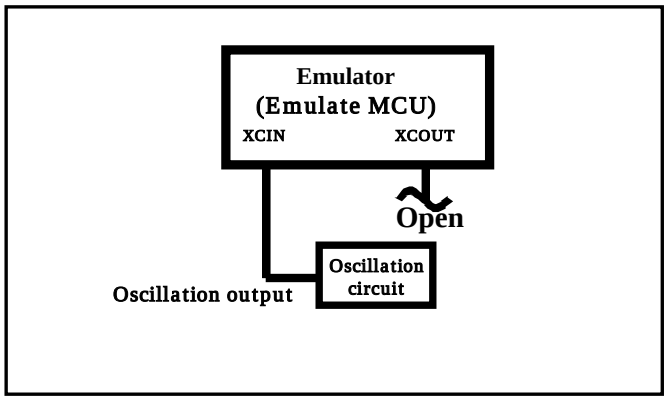


Figure 3.7 Oscillation Circuit on the target system

Note that in the oscillator circuit shown in Figure 3.8 where a resonator is connected between the X_{IN} and X_{OUT} pins, oscillation does not occur because devices such as LCC socket are used between emulate MCU and the target system.

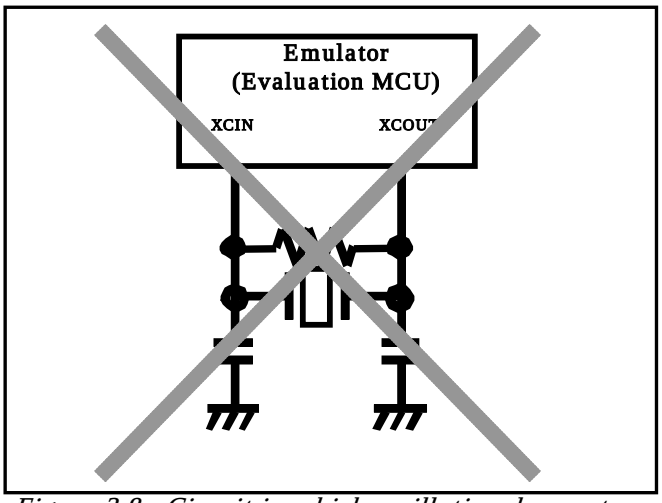


Figure 3.8 Circuit in which oscillation does not occur

IMPORTANT

Notes on Changing the Clock Supply:

- X_{CIN}-X_{OUT} (main clock) pins cannot be changed in the oscillator circuit on the emulator. When changing the main clock, use an oscillation circuit board optionally sold. Note that oscillation circuit on the target system can be used only for the oscillator output.
- For using X_{CIN}-X_{COUT} (sub-clock) pins, it is necessary to change " SW2 (X_{CIN}/$P8_7$ selection switch " of the emulator. For how to set it, refer to "2.3 (1) $P8_7$/X_{CIN} selection switch".(page 19).

Chapter 4. Specifications

This chapter describes specifications of this product.

4.1 Specifications 33
4.2 Memory Map 34
4.3 DC Characteristics 35
4.4 External Dimensions of the Emulator 36

Chapter 4. Specifications

4.1 Specifications

Table 4.1 Specifications of S3062PT-CPE-2

Function	Specifications	
Applicable MCUs	Renesas Technology M16C family M16C/62 group and M16C/30P group	
Clock supply (*1)	Main clock (X_{IN})	Clock mounted on emulator (6MHz) Multiply PLL by 4: 24MHz
		Clock can be changed using oscillation circuit board (option).
	Sub clock (X_{CIN})	Clock mounted on emulator (32.768kHz)
		Frequency can be changed from the target system.
Maximum Operating frequency	24MHz (Power voltage 5.0V/3.3V, 0 wait)	
Minimum Operating Frequency	32.768kHz	
Usable MCU modes	Single-chip mode Memory expansion mode (normal mode, separate bus)	
Emulate MCU	M30627FHPGP	Emulate chip
	M30624FGMFP	Control MCU
Internal Emulation Memory	Internal RAM area	Using SRAM inside emulate chip: 31K bytes
	Internal ROM area	Using flash memory inside flash memory: 512K bytes
Basic debugging functions	Download, S/W break (64 points), Program execution/stop (allows free-run execution supporting S/W breaks), Hardware break (1-point) Memory reference/Setting (reference/setting C-variables, run-time execution), Register reference/setting, Disassemble display, C-source level debugging, etc.	
Real-time tracing function	•1K-cycle bus information is recordable (Address: 20 bits, Data: 16 bits, MCU status) •2 trace modes are supported (Before Break mode/After Go mode)	
Real-time RAM monitor	1K size (Mappable in SFR, Internal SRAM area)	
Hardware Break Function	1 point (Command fetch, Data Read/Write, Data comparison)	
Execution Time Measurement Function	Time between program start to stop is measurable.	
Host Operating Environment	IBM PC/AT compatible / Windows 98/Me/2000/XP	
PC interface	USB 1.1 compatible (Full-speed mode)	
Connection to Target System	Connect using package conversion unit (including 100P6S-A compatible as standard equipment) Package conversion units for100P6Q-A and 128P6Q-A are sold separately.	
Power Supply for Emulator	DC 9V supplied from external (prepare the power supply separately)	
Power Voltage for MCU and Power supply	VCC1=5.0V (±5%), 3.3V (±5%), VCC2=5V (±5%), 3.3V (±5%) It should be VCC1≧VCC2.	
Operating Environmental Condition	When Operating	Temperature 5-35 degrees centigrade / Humidity 20-80% (non condensing) *Amount of dust should be around the same level as in general office environment.
	In Storage	Temperature -10-60 degrees centigrade / Humidity 0-90% (non condensing) *Amount of dust should be around the same level as in general office environment.
External Dimensions/Weight	Approx. 105(W) x 34 (H) x 85 (D) mm (not including lugs) Approx 200g.	

*1 Ring oscillators are not applicable.

4.2 Memory Map

Figure 4.1 shows memory maps when using the emulator. For the memory map of the actual MCU, refer to the User's Manual of your MCU.

Make note of the fact that the memory map of the actual MCU differ from that of emulator. Do not access to the area noted "Do Not Access" in the memory map when using the emulator. Otherwise, the emulator may malfunction.

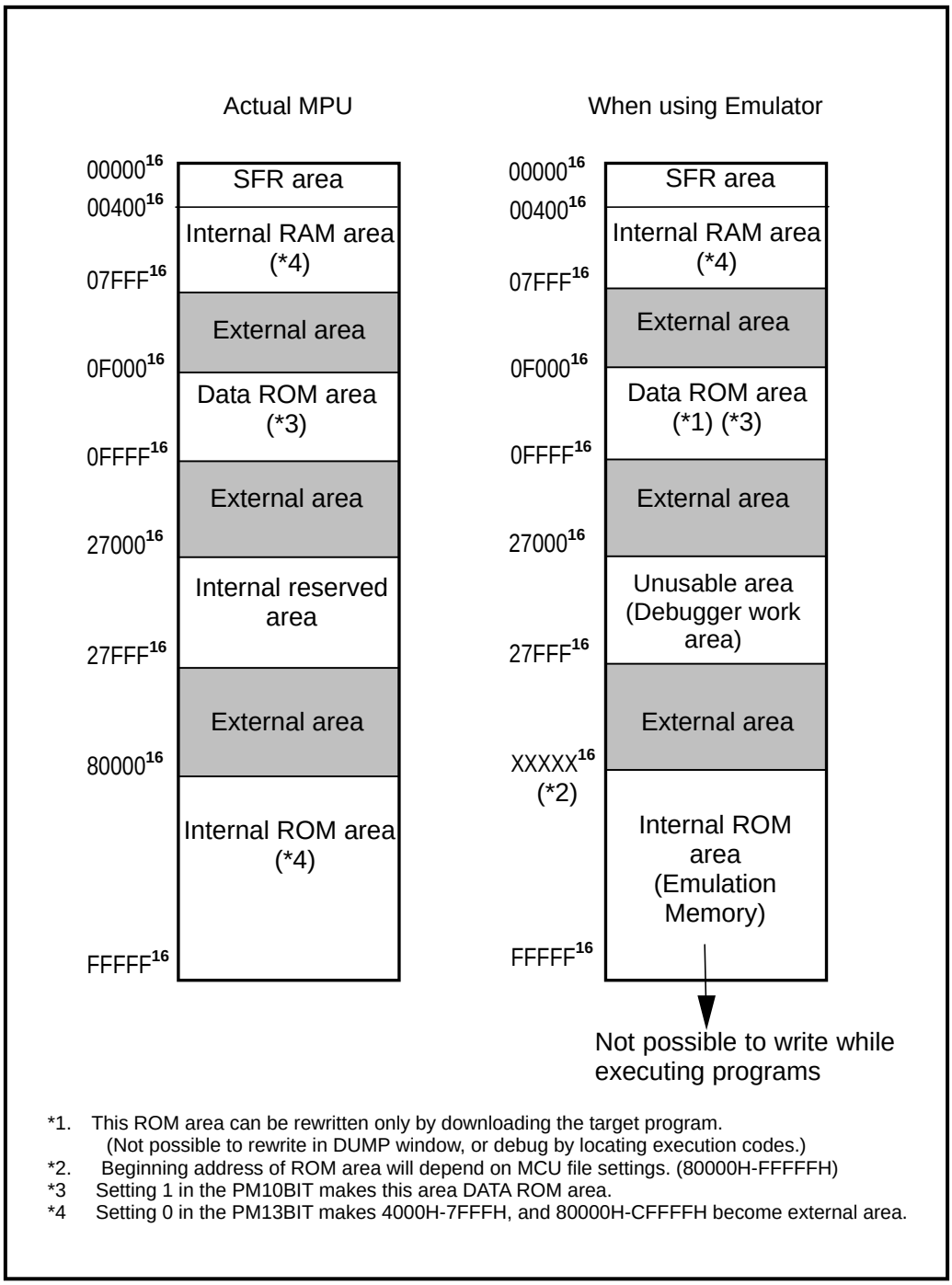


Figure 4.1 Memory map when using emulator

4.3 DC Characteristics

P0-P5, and P10 are actualized by emulate circuit, and have different electric characteristics from the actual chip. Its output drive characteristics are shown in Figure 4.2. The input threshold is all TLL level.

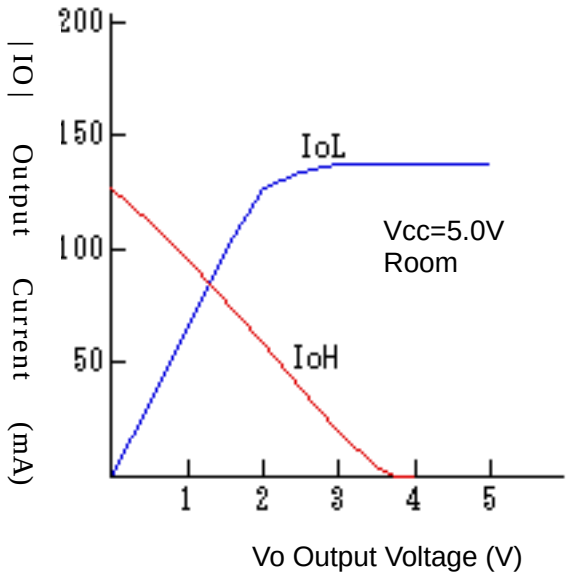


Figure 4.2 P0-P5 Output Drive Characteristics (Common)

(1) P1, P3-P5

Setting a pull-up control register is possible, but for actual signals, there is 510K-ohm resistance for both input and output automatically.

(2) P0, P2

Setting a pull-up control register is possible, but for actual signals, there is 510K-ohm resistance for both input and output automatically. However, only when the analog input is set, the pull-up circuit is disabled.

(3) P10

Regardless of input/output, pull-up control register sets the 510K-ohm resistance automatically . However, only when the analog input is set, the pull-up circuit is disabled. Note that once you set the analog input, pull-up circuit will remain disabled unless analog port is switched to another port or RESET button of the program is pressed on GUI.

⚠ CAUTION

Notes on Other Characteristics :

- The input threshold of above pins is all TTL level.
- When using A/D converter, Analog data will be input into A/D port via analog switch.
- For ports other than P10, the output voltage may become less than the actual

4.4 External Dimensions of the Emulator

External dimensions of the emulator, External dimensions of package conversion unit(100P6S), and External dimensions when connecting to target system are shown in Figure 4.3, 4.4, and 4.5 respectively.

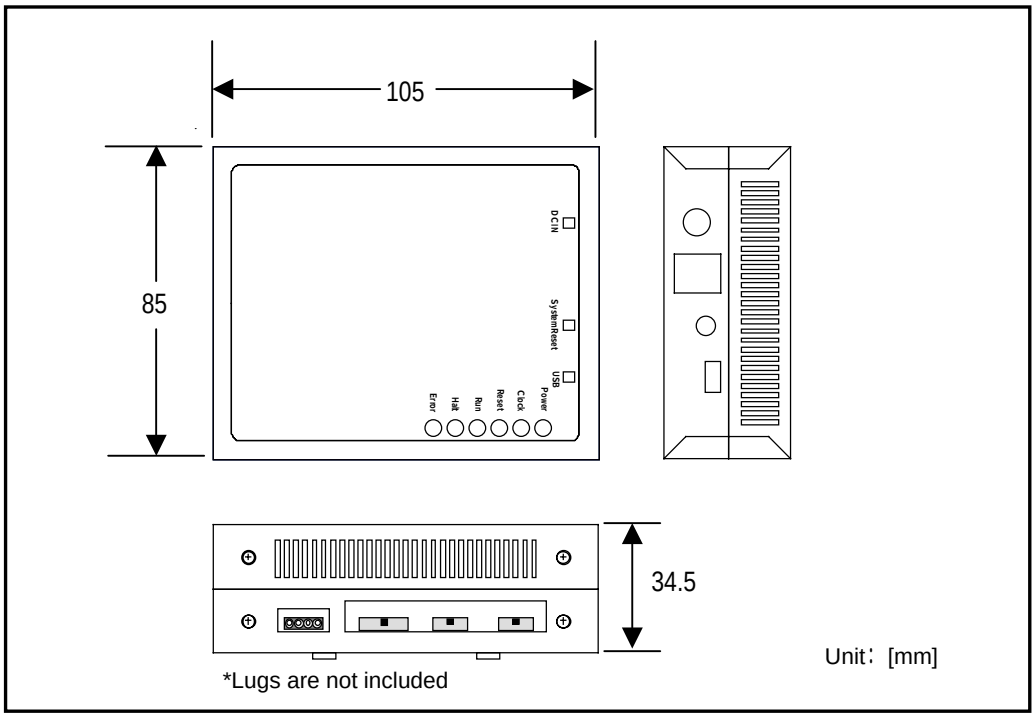


Figure 4.3 External dimensions of emulator

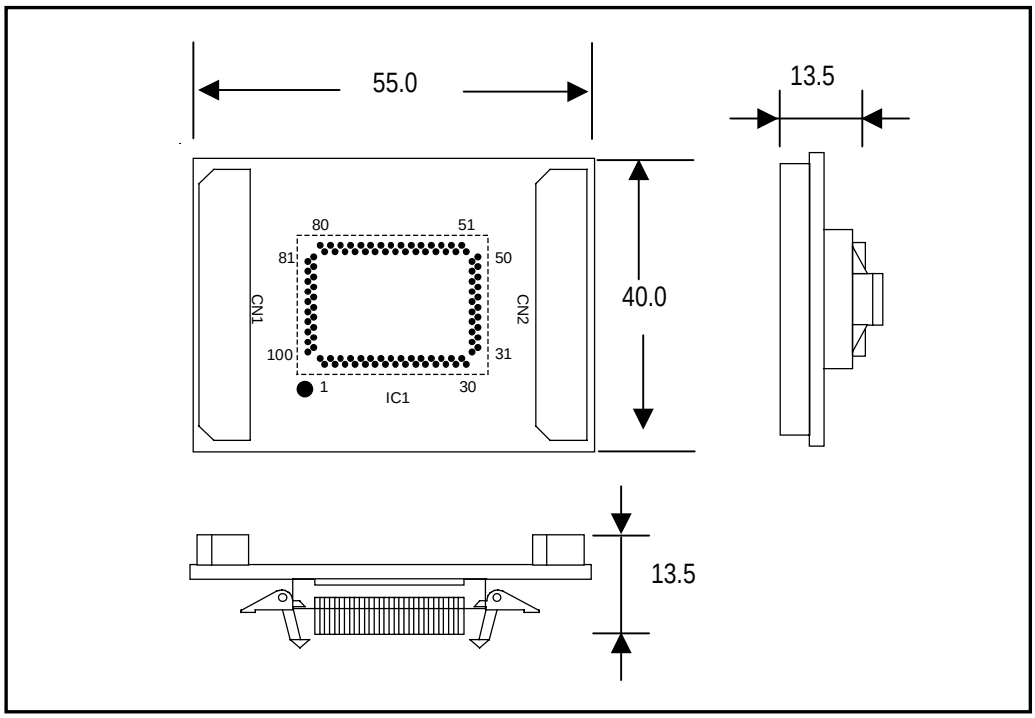


Figure 4.4 External dimensions of package conversion unit

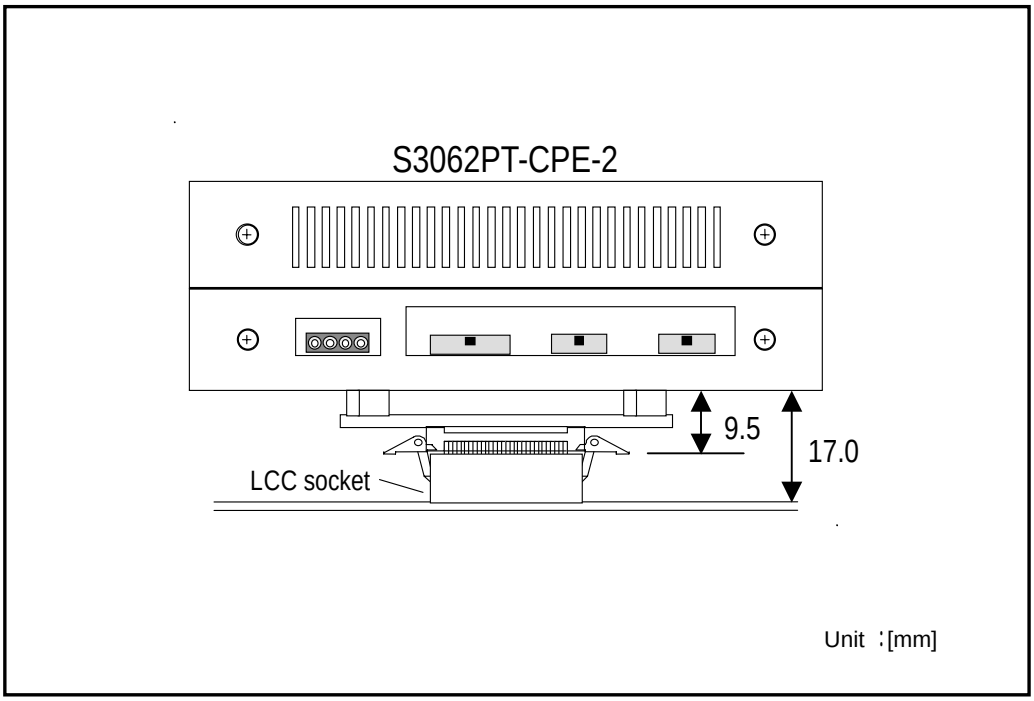


Figure 4.5 External dimensions when connecting to target system

Chapter 5. Troubleshooting

This chapter describes how to troubleshoot when this product does not work properly.

5.1 Troubleshooting Until the Emulator Starts Up 39
5.2 Troubleshooting When Using Emulator Debugger PD30S 42
5.3 When the Operation of the Emulator is Abnormal 43

Chapter 5. Troubleshooting

5.1 Troubleshooting Until the Emulator Starts Up

Figure 5.1 shows the flowchart to remedy the troubles from the time when power to the emulator is activated until the emulator debugger starts up.

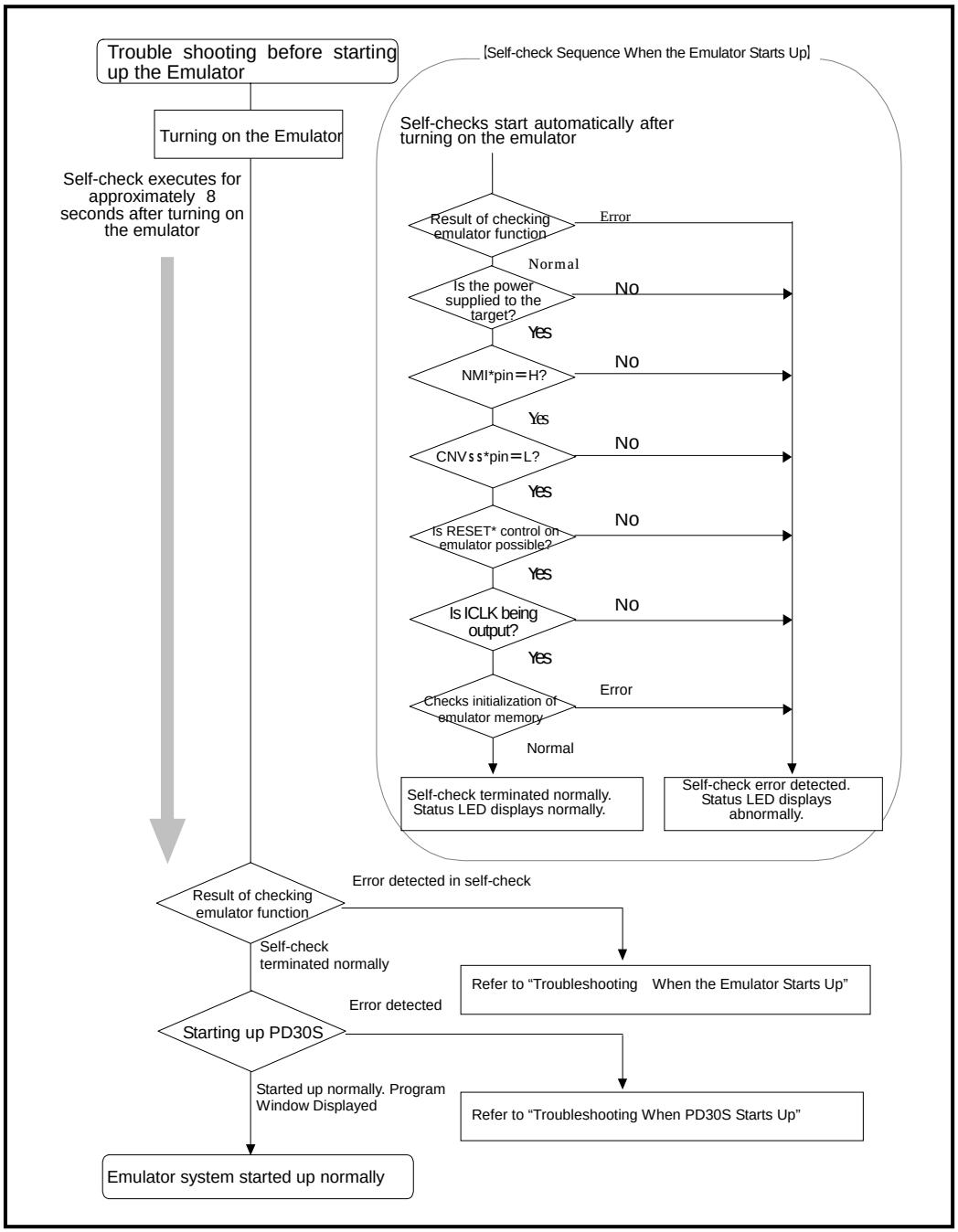


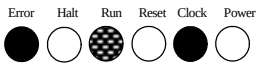
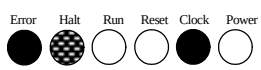
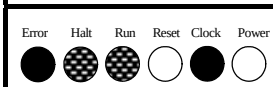
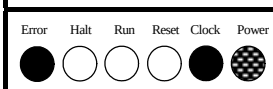
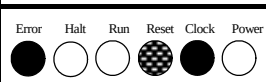
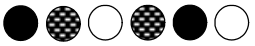
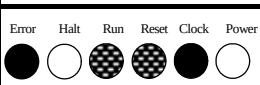
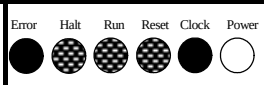
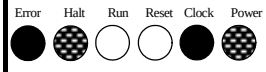
Figure 5.1 Flowchart to remedy the troubles

(1) Troubleshooting When the emulator Starts Up

Table 5.1 lists how to remedy the troubles when the Status LED of the emulator display is abnormal after powering on the emulator.

When the error is detected, shut off the power of the emulator and the target system and follow the steps in Table 5.1. Then, reactivate the power of the emulator and the target system.

Table 5.1 Error display and how to remedy it when starting up the emulator

Item	LED display	Connection to the target system	Symptoms & Checkpoints
Emulator function check		-	Emulator does not work properly. ⇒Check power is being supplied to the emulator. ⇒The emulator may be damaged. Contact your nearest distributor.
		-	
		-	
		-	
Power supply for target system check		Connected	Emulator does not work properly because power is not being supplied to the target system. ⇒Check power is being supplied to the target system.
		Not connected	Emulator does not work properly. ⇒Check power is being supplied to the emulator. ⇒The emulator may be damaged. Contact your nearest distributor.
NMI* pin check		Connected	Emulator does not work properly because the NMI* pin is "L" level. ⇒Check the NMI pin is "H" level.
		Not connected	Emulator does not work properly. ⇒The emulator may be damaged. Contact your nearest distributor.
CNVss pin check		Connected	Emulator does not work properly because the CNVSS pin is "H" level. ⇒ Debugging cannot be done with this emulator in the "micro-processor mode". Check the CNVSS pin is "L" level.
		Not connected	Emulator does not work properly. ⇒The emulator may be damaged. Contact your nearest distributor.
Reset control check		-	Emulator does not work properly. ⇒Check power is being supplied to the emulator. ⇒The emulator may be damaged. Contact your nearest distributor.
Emulation memory initialization error		-	Emulator does not work properly. ⇒The emulator may be damaged. Contact your nearest distributor.

Explanatory note) ●:ON ◍:Blinking ○:OFF

(2) Troubleshooting When Emulator Debugger PD30S Starts Up

Table 5.2 lists error messages and how to remedy them when starting up PD30S.

Table 5.2 Error message and how to remedy it when starting up PD30S

Error	Connection to the target system	Checkpoint
Communication ERROR. Can't accept data.	-	⇒Check the emulator's Status LEDs. If flashing, the emulator is not working properly. Check settings as explained in "(1)Troubleshooting When the Emulator Starts Up". ⇒Check the connection of the PC connecting cable.
Not Compact Emulator.	-	⇒Check if any equipment other than emulator is connected.
Target MCU is not given clock.	-	⇒Check if the emulator system's oscillation circuit works properly.
Target MCU is unable to reset.	-	
The version of PD30S and the firmware on the target are not compatible.	-	⇒Contact your nearest distributor.
Please download the firmware to the target.	-	

5.2 Troubleshooting When Using Emulator Debugger PD30S

After PD30S has started up normally, in case errors occurred while using it, remedy the troubles referring Table 5.3.

Table 5.3 Error message and how to remedy it when using PD30S

Error	Connection to the target system	Checkpoint
Target MCU is not given clock currently.	-	⇒Check if the emulator system's oscillation circuit works properly. Also, please refer to "2.3(1) Selection Switch" on page 19.
Target MCU is unable to reset.	-	⇒Check if the emulator system's oscillation circuit works properly. Also, please refer to "2.3(1) Selection Switch" on page 19.
Target MCU is reset state. Please reset target systems.	Connected	⇒The target MCU has been reset. Cancel the reset.
Target MCU is HOLD state.	-	⇒Check if the emulator system's oscillation circuit works properly. Also, please refer to "2.3(1) Selection Switch" on page 19. ⇒The MCU may be in the stop or wait mode. Either reset the MCU or cancel the mode with an interrupt.
Target MCU is not given power.	Connected	⇒Check the power supply and GND are connected properly. ⇒If there is no problem found with the target system, please contact your nearest distributor.

5.3 When the Operation of the Emulator is Abnormal

Self-check is a function to check the memory etc. mounted in the emulator. Self-check is executed when the emulator starts up, and detailed check is executed by following the procedure below.

For this self-check, be sure to disconnect the target system.

(a) Set the dip switch of the emulator as factory setting.

(b) If the target system is connected, disconnect it.

(c) Use a main clock mounted as the factory setting (6MHz oscillator)

(1) Self-check Procedure in the Self-check Mode

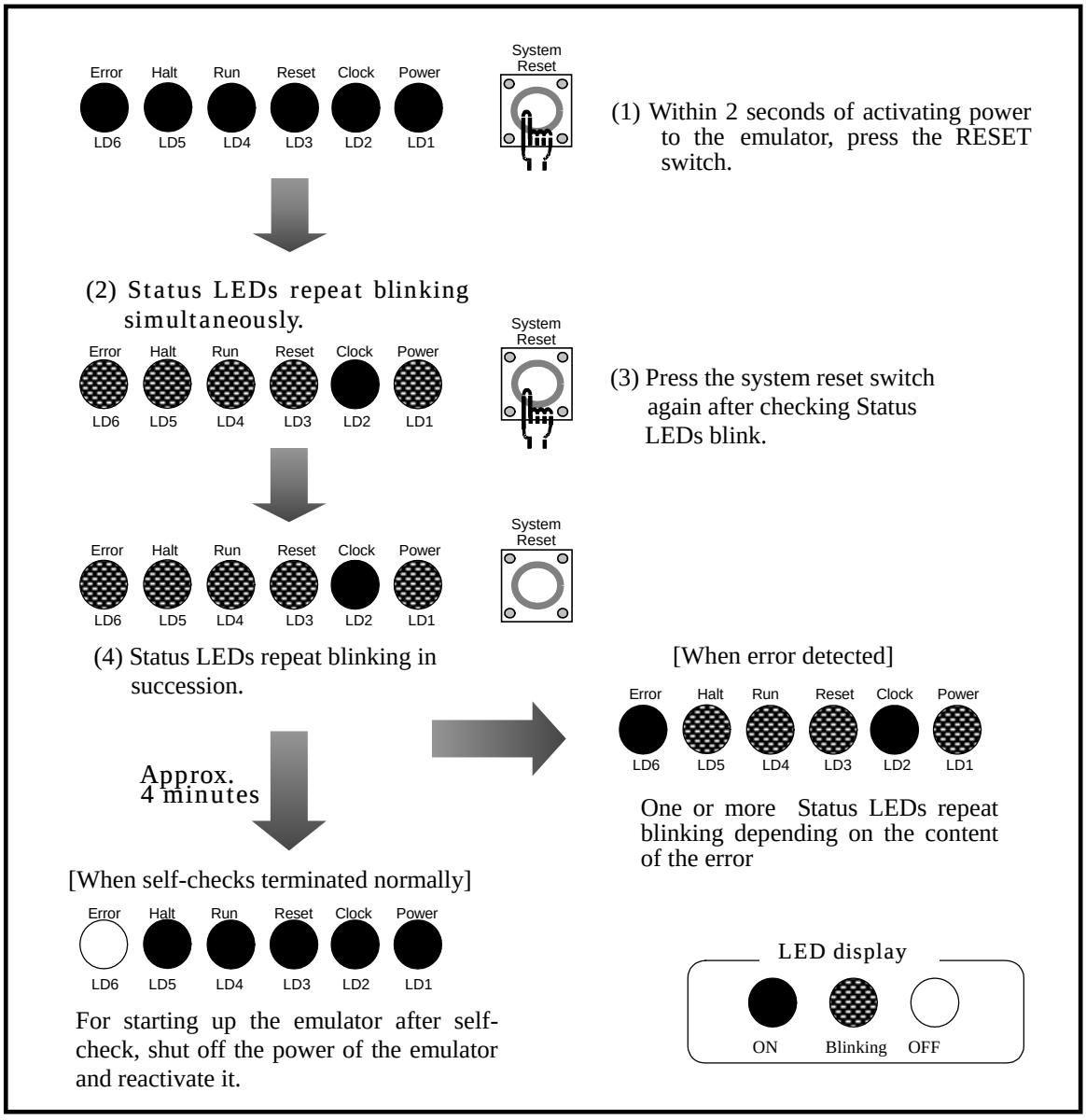

Error Halt Run Reset Clock Power
LD6 LD5 LD4 LD3 LD2 LD1
System Reset
(1) Within 2 seconds of activating power to the emulator, press the RESET switch.
(2) Status LEDs repeat blinking simultaneously.
(3) Press the system reset switch again after checking Status LEDs blink.
(4) Status LEDs repeat blinking in succession.
Approx. 4 minutes
[When self-checks terminated normally]
For starting up the emulator after self-check, shut off the power of the emulator and reactivate it.
[When error detected]
One or more Status LEDs repeat blinking depending on the content of the error
LED display
ON Blinking OFF

Figure 5.2 Self-check procedure

(2) If an Error is Detected in Self-checks

Table 5.4 lists how to remedy the troubles if the Status LED display is abnormal in self-checks.

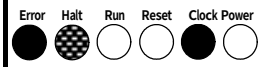
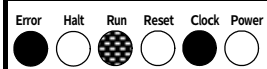
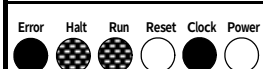
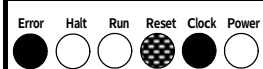
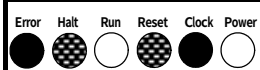
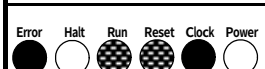
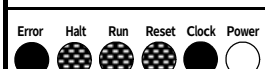
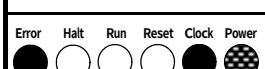
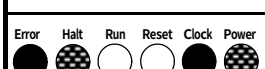
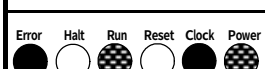
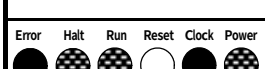
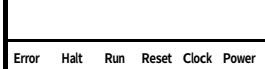
When an error is detected, shut off the power of the emulator and the target system and follow the steps in the Table 5.4. Then, reactivate the power of the emulator and the target system.

⚠ CAUTION

Notes on Self-checks:

- Be sure to disconnect the target system before executing self-checks.
- If self-checks do not result normally, the emulator may be damaged. Please contact your nearest distributor.
- When an oscillator installed in the emulator is changed, self-checks may not terminate normally. Use the oscillator of 6MHz when executing self-checks.

Table 5.4 Error display in self-checks and how to remedy it.

LED display	Checkpoint
	Emulator does not work properly. ⇒Check if power is being supplied to the emulator. ⇒If power is being supplied to the emulator, the emulator may be damaged. Report the LED status to your nearest distributor.
	
	
	
	
	
	
	
	
	
	
	

Explanatory note) ●:ON, ▩Blinking, ○FF

MEMO

Chapter 6. Maintenance

This chapter describes how to maintenance, repair provisions and how to request for repair.

6.1 Maintenance 49

Chapter 6. Maintenance and Guarantee

6.1 Maintenance

If dust or dirt collects on any equipment of your emulation system, wipe it off with a soft dry cloth.

Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.

⚠ CAUTION

Note on Shipping the Product:

- When sending your S3062PT-CPE-2 for repair, use the packing box and cushion material supplied with the S3062PT-CPE-2 when delivered to you and specify handling caution for it to be handled as precision equipment.
  If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with the S3062PT-CPE-2 (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

Technical Support Communication Sheet

Date : / /

(Total Pages :)

To

Contact Address	Product Information
Company :	Emulator : Serial number :
Department :	Emulator debugger : PD30S
Responsible person :	Version :
Phone :	Host machine :
FAX :	OS & version :
E-mail :	Target MCU :
Address :	
Message :	

Please fill in within heavy-line frame.

Date received : / / /	Date replied :
Person in charge :	
MEMO :	

Consecutive No.

Inquiries (Attach a list of your inquiries, if necessary.)

Overseas Specifications

- Obtaining the CE Mark: (EMI: EN55011 Group1 Class A, EMS: EN61000-6-2)

- FCC Compliance:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions;

(1) This device may not cause harmful interference, and (2) this device must accept any interference received,

including interference that may cause undesired operation.

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